Non-Intentional Death from Poisoning in Children
Victoria 1988 - 2000

A joint initiative of the
Department of Human Services
&
State Coroner’s Office

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Injury Prevention Research Officer
State Coroner’s Office
Incidents of Non-Intentional Poisoning Fatalities

Deaths from non-intentional poisoning in children (0-14 years of age) are rare in Victoria, n=12. All known incidents that occurred between January 1988 and December 2000 are listed in Table 2 below (See Appendix 3 for case details). This information was sourced from the Victorian State Coroner’s Office files, the Monash University Accident Research Centre (MUARC) publication *Hazard* and the Consultative Council on Obstetric and Pediatric Mortality and Morbidity (CCOPMM) annual reports.

Cases where children died from carbon monoxide poisoning in either house fires or motor vehicle accidents were not included in this investigation. These cases will be subject to future investigation. Also cases where children (up to and including the age of 18) intentionally ingested substances to end their own life were not investigated in detail. However, the following three cases were identified:

Table 1
Intentional Self-Harm by Poisoning in Children (0-18years) in Victoria 1988-2000

<table>
<thead>
<tr>
<th>Month &amp; Year</th>
<th>Gender</th>
<th>Age</th>
<th>Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 1990</td>
<td>Female</td>
<td>15 years</td>
<td>paracetamol overdose</td>
</tr>
<tr>
<td>August 1992</td>
<td>Female</td>
<td>17 years</td>
<td>15 “Sunequin” tablets and 6 “Act 3” tablets.</td>
</tr>
<tr>
<td>October 1998</td>
<td>Male</td>
<td>18 years</td>
<td>paracetamol overdose</td>
</tr>
</tbody>
</table>

Although it is difficult to draw conclusions and make recommendations from such a small number of cases, there were some similarities among cases. All the incidents involving animal and plant poisonings and chemical ingestions (n=7) occurred in rural areas, all but one at a location other than the child’s home. These locations were either other people’s homes or an area frequently populated with people, such as a camping grounds and caravan parks. This finding was not surprising given the circumstances of the cases, for example 25% (n=4) of all the cases involved snake envenomation. Snakes are commonly found in rural areas as opposed to more urban environments.

Where the poisoning involved the ingestion of medical and chemical substances, access was an issue because the child was either old enough to negotiate a childproof cap or safety behaviours were not exhibited. Overall a lack of parental supervision was a factor in these children coming into contact with toxic substances.
Table 2
Non-Intentional Poisoning of Children (0-14 years) in Victoria 1988-2000

<table>
<thead>
<tr>
<th>Year</th>
<th>Age</th>
<th>Age Unit</th>
<th>Gender</th>
<th>Poisoning Agent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988 July</td>
<td>3</td>
<td>years</td>
<td>male</td>
<td>“strychnine” ingestion.</td>
</tr>
<tr>
<td>1989 July</td>
<td>2</td>
<td>years</td>
<td>male</td>
<td>“carbamazepine” (anti-seizure drug) ingestion.</td>
</tr>
<tr>
<td>1989</td>
<td>11</td>
<td>years</td>
<td>male</td>
<td>Snake envenomation (Tiger Snake)</td>
</tr>
<tr>
<td>1989</td>
<td>14</td>
<td>years</td>
<td>male</td>
<td>Carbon monoxide and dihydrogen sulphide inhalation.</td>
</tr>
<tr>
<td>1990 November</td>
<td>20</td>
<td>months</td>
<td>male</td>
<td>Snake envenomation.</td>
</tr>
<tr>
<td>1994</td>
<td>3</td>
<td>years</td>
<td>male</td>
<td>“hemlock” (poisonous plant) ingestion.</td>
</tr>
<tr>
<td>1996 May</td>
<td>12</td>
<td>years</td>
<td>female</td>
<td>Ingestion of anti-depressant medication “dothiepin”.</td>
</tr>
<tr>
<td>1999 March</td>
<td>7</td>
<td>years</td>
<td>male</td>
<td>Snake envenomation (Tiger Snake).</td>
</tr>
<tr>
<td>2000 July</td>
<td>10</td>
<td>years</td>
<td>female</td>
<td>Carbon monoxide inhalation.</td>
</tr>
<tr>
<td>2000 August</td>
<td>10</td>
<td>months</td>
<td>female</td>
<td>“shellite” petroleum spirit ingestion.</td>
</tr>
<tr>
<td>2000 November</td>
<td>16</td>
<td>months</td>
<td>female</td>
<td>Snake envenomation (Brown Snake).</td>
</tr>
</tbody>
</table>

As can be seen from Table 1, most of the incidents occurred in the late 1980’s and the late 1990’s. The average age of the child 102.67 months or 8.56 years and the gender breakdown was fairly even with seven males and five females.

The incidents outlined in Table 1 can be grouped into four categories:
- Toxic effects of contact with venomous animals and poisonous plant, n=5;
- Carbon monoxide inhalation, n=3;
- Ingestion of non-medical substances [chemicals], n=2; and
- Ingestion of medical substances [therapeutic drugs/medications], n=2.

**Toxic Effects of Contact with Venomous Animals & Poisonous Plants - n=5**

**Snake Envenomation**
Four of the five deaths from poisonous animals or plants were from snakes, n=4 (two from a Tiger Snake, one from a Brown Snake and one from an unspecified snake). In three of the four cases, the child was presented at hospital with various symptoms such as fever, vomiting, convulsions, and breathing difficulties, not specifically for a snakebite. It was only at some time later that poisoning from a snakebite was diagnosed. The time period between the incident and correct diagnosis varied in each case. In one case snake envenomation was diagnosed and treated immediately, one within four hours and anti-venom was administered in a timely manner, one was
determined only after a postmortem examination and in the other case diagnosed four days after symptoms were present.

Information from one coronial finding suggests that snake bites are generally very difficult to detect as Australian venomous snakes have small fangs and leave no visible puncture wounds, there is little swelling or visible reaction at the site of the bite (Finding at Inquest of case 0674/99). This was further hindered by the fact that in 75% (n=3) of the cases, the child did not report being bitten by a snake. Two of the three children who died were toddlers, 20 months and 16 months, and possibly would have been unable to communicate their injuries even if they did see the snake [one of the toddlers was also found unconscious]. The other child was 7 years old but did not report being bitten by a snake as he was more concerned with a serious laceration to his foot and probably didn’t see it as he was running through long grass.

The symptoms suffered by these children were similar to those of more common and equally fatal complaints such as meningitis. In these cases hospital staff were concerned with diagnosing and treating these problems and did not appear to have conducted thorough external examinations. As mentioned above, even if an external examination was conducted, the bite may well have been dismissed as a minor injury due to the difficulty in detecting snake bite wounds.

Other relevant information regarding these fatalities was that they all occurred in rural Victoria during the afternoon of the warmer months of the year (November to March). The location of the bite was on the lower limbs of the child, generally above or around the knee. These incidents all occurred in or around long grass at premises where the child did not usually reside or in bush land the child was visiting with their parents, such as caravan parks and camping grounds.

Although deaths from snakebites are rare, there are some measures that may assist in the prevention of these fatalities in the future.

- Signage in areas where venomous snakes are known to frequent.
- Education to all Victorian’s, particularly those who reside in rural areas, on the following [a pamphlet could be displayed at camping grounds and popular bush land areas (where two of these incidents occurred)]:
  - poisonous snakes found in Victoria;
  - symptoms of snake bites and the difficulty in detecting wounds from venomous snakes;
  - importance of timely anti-venom administration at a hospital and general first aid for a snake bite;
  - educating children not to play in or around long grass; and
  - parental supervision.

**Hemlock Ingestion**

There was one death of a child from the ingestion of a poisonous plant. A three-year-old boy was playing unsupervised with three other children, all under the age of 7 years, in the rear yard of a rural property. All children ate the green leaf of a plant growing in the yard, later found to be “Hemlock”, however the deceased ingested the material while the others spat it out. Within two and a half hours the child was found to be deceased.

Drummer et al (1995), report that Hemlock is often found in paddocks and backyards of houses, although its growth is generally restricted to gullies and wetter areas.
exposed to rain or irrigation. Drummer et al argue that Hemlock poisoning is preventable by eradicating the plant. Community awareness of the toxic effects of Hemlock was recommended by Drummer et al and was undertaken in the area following the death. Wider community awareness of poisonous plants generally would prevent any repeat of this type of death or hospitalisations.

**Carbon Monoxide Inhalation - n=3**

There were three known deaths of children from carbon monoxide poisoning. Two of the cases occurred in 1988 and 1989 as reported in the respective annual reports of the Consultative Council on Obstetric and Pediatric Mortality and Morbidity (CCOPMM). The Coronial Services Centre (CSC) only began recording cases in mid 1989 and as yet these cases have not been located.

The remaining death from carbon monoxide poisoning was of a ten-year-old girl, her sixteen-year-old sister and their father in a caravan in July 2000. A defective portable gas heater emitted carbon monoxide while the three were asleep. The caravan was poorly ventilated.

Carbon monoxide detectors are currently on the market in the United States as a means of preventing carbon monoxide poisoning in the home from malfunctioning or misused gas appliances (see Appendix 1 & 2). Further investigation into the relationship between hospital admissions from carbon monoxide poisoning in the home may reveal whether these products would be a means of preventing death and injury of this kind in Australia.

**Ingestion of Non-Medical Substances [chemicals] - n=2**

There were two child deaths from chemical ingestion, one from “strychinine” ingestion in 1988 and one from “shellite” ingestion in 2000.

The case of shellite ingestion was of a ten-month-old female, which occurred in rural Victoria. The infant’s mother was working at the time of the incident with another woman. The two women were cleaning a photocopier with the shellite, which was placed on the floor with the lid off. The infant crawled over to the bottle and ingested a small amount of the liquid.

Poisoning prevention measures were in place with the presence of a childproof cap, however the infant was able to ingest the poison because the lid was off and the bottle was on the floor in the vicinity of where the infant was playing. This case highlights the problem of parents underestimating the rate of their child’s development, especially their motor skills. The Monash University Accident Research Centre (MUARC) in their publication *Hazard*, Edition 27 June 1996, report that organisations such as Kidsafe run programs on child development and associated risk which are aimed at addressing this problem (Routley et al, 1996).

The case of strychnine ingestion was of a three-year-old boy on a rural property rented by his mother. The property consisted of an old farmhouse with a number of sheds and out buildings. The child was playing with his five year old sister in the rear yard of their property. The child found an old bottle in one of the sheds, which did not have a lid on it and he ingested some of the contents. Police later found a small amount of a pink crystal substance later confirmed to be strychnine.
Ingestion of Medical Substances [therapeutic drugs/medications] - n=2.

Two children died as a result of ingesting medical substances, both of which were prescribed to someone other than themselves. The first case occurred in July 1989 and involved a 3-year-old male ingesting “carbamazepine”, an anti-epileptic drug left by someone at his grandparent’s house where he was visiting. His parents were in another room at the time of the incident and it is unknown whether the container had a childproof cap.

The second death involved a 12-year-old female who ingested a toxic dose of her father’s anti-depressant tablets called “dothiepin”. These drugs were located in a medicine cabinet in the kitchen and due to the child’s age she was able to negotiate the childproof cap. The coroner found that this death was non-intentional. These two cases highlight the need for both childproof caps and lockable medicine cabinets.

Despite the low rate of death from medical substances, the literature on Victoria hospitalisation rates are of concern. MUARC reported in their publication *Hazard*, Edition 27 June 1996, that poisoning was the second major cause of hospital admissions in children under the age of 5 years (Routley et al, 1996). Of the 4,608 poisoning admissions between July 1987 and June 1994, 74% were attributed to medications, namely respiratory system/muscle relaxants, paracetamol and anti-histamines (Routley et al, 1996). Specifically in relation to paracetamol, Routley et al (1996) reported that this was the leading cause of both presentations and admissions to hospital. This publication did not address how children accessed this medication.
References


Appendix 1 – Carbon Monoxide Detectors & Poisoning Prevention

Source: http://www.homesafe.com/coalert/detect.htm

Carbon monoxide is a by-product of combustion, present whenever fuel is burned. It is produced by common household appliances such as gas or oil furnaces, clothes dryers, water heaters, ovens and ranges. A charcoal grill operating in an enclosed area, a fire burning in a fireplace or a car running in an attached garage also produces carbon monoxide.

According to the Journal of the American Medical Association (JAMA), carbon monoxide is the number one cause of poisoning deaths in the U.S.A. Making sure furnaces and other potential carbon monoxide sources are properly vented and in good working condition, along with owning a UL listed carbon monoxide detector, could become a matter of life and death.

The makers of First Alert (R), the leading brand in carbon monoxide detector technology, suggests mounting the detector on the ceiling. This also puts the detector out of the way of potential interference, such as pets or curious children. According to UL Standard 2034, home carbon monoxide detectors must sound a warning before carbon monoxide levels reach 100 parts per million over 90 minutes, 200 parts per million over 35 minutes or 400 parts per million over 15 minutes. The standard requires the alarm must sound before an average, healthy adult begins to experience symptoms of carbon monoxide poisoning. The warning provides time to evacuate the premises.

To identify the source/s of carbon monoxide, have a professional check the following:

Gas or oil furnaces are frequently the source of carbon monoxide leaks. Measure concentrations of carbon monoxide in flue gases. Check all connections to flue pipes and venting systems for cracks, gaps, rust, corrosion or debris. Check the filters and filtering systems for dirt and blockages. Check the combustion chamber and heat exchanger for cracks, holes, metal fatigue or corrosion. Check furnace flame, burners and ignition systems. A predominately yellow, flat, lazy-looking flame in a natural gas furnace indicates fuel is not burning efficiently and is thus releasing higher than usual levels of carbon monoxide. Oil furnaces with a similar problem produce an 'oil' odor, but remember you can't smell, see or taste carbon monoxide.

Chimneys and venting systems must be carefully checked for blockages caused by debris, animal nests, cracks, holes or cave-ins. A blocked chimney or venting system can force dangerous gases back into your home.

Venting and fan systems on all fuel burning appliances must be inspected for proper installation to assure carbon monoxide is vented out rather than in. Don't forget gas water heaters, clothes dryers, space heaters or wood burning stoves.

Inspect fireplaces for blocked or bent chimneys or flues, soot and debris or holes in the chimney that could release carbon monoxide exhaust back into the home.

Stove pilot lights in a closed-up home can be a source of carbon monoxide build-up if not operating properly because they are not vented to the outside. Check to be sure they are operating properly.

Fireplace pilot lights can also produce carbon monoxide and should be checked regularly.
Never burn charcoal inside no matter how much you want to recapture summer and never use your gas stove as a heater. Keep the oven door closed and use it for cooking only.

Never leave a car running in an attached garage even if the garage door is open.

Taking time to understand the characteristics of carbon monoxide and how Underwriters Laboratories, Inc. (UL) listed carbon monoxide detectors work could save your life.

Information provided by FIRST ALERT (R).

Figure 1
Carbon Monoxide Detector
Appendix 2 – Carbon Monoxide Information

Source:
Environmental Health Center
A Division of the National Safety Council
1025 Connecticut Avenue, NW, Suite 1200, Washington, DC 20036
(202) 293-2270 (tel); (202) 293-0032 (fax)
Web site airqual@nsc.org.

What Is It?
Carbon monoxide (CO) is an odorless, colorless gas that interferes with the delivery of oxygen in the blood to the rest of the body. It is produced by the incomplete combustion of fuels.

What Are the Major Sources of CO?
Carbon monoxide is produced as a result of incomplete burning of carbon-containing fuels including coal, wood, charcoal, natural gas, and fuel oil. It can be emitted by combustion sources such as unvented kerosene and gas space heaters, furnaces, woodstoves, gas stoves, fireplaces and water heaters, automobile exhaust from attached garages, and tobacco smoke. Problems can arise as a result of improper installation, maintenance, or inadequate ventilation.

What Are the Health Effects?
Carbon monoxide interferes with the distribution of oxygen in the blood to the rest of the body. Depending on the amount inhaled, this gas can impede coordination, worsen cardiovascular conditions, and produce fatigue, headache, weakness, confusion, disorientation, nausea, and dizziness. Very high levels can cause death.

The symptoms are sometimes confused with the flu or food poisoning. Fetuses, infants, elderly, and people with heart and respiratory illnesses are particularly at high risk for the adverse health effects of carbon monoxide.

An estimated 1,000 people die each year as a result of carbon monoxide poisoning and thousands of others end up in hospital emergency rooms.

What Can Be Done to Prevent CO Poisoning?
- Ensure that appliances are properly adjusted and working to manufacturers’ instructions and local building codes.
- Obtain annual inspections for heating system, chimneys, and flues and have them cleaned by a qualified technician.
- Open flues when fireplaces are in use.
- Use proper fuel in kerosene space heaters.
- Do not use ovens and gas ranges to heat your home.
- Do not burn charcoal inside a home, cabin, recreational vehicle, or camper.
- Make sure stoves and heaters are vented to the outside and that exhaust systems do not leak.
- Do not use unvented gas or kerosene space heaters in enclosed spaces.
- Never leave a car or lawn mower engine running in a shed or garage, or in any enclosed space.
- Make sure your furnace has adequate intake of outside air.

What If I Have Carbon Monoxide Poisoning?
Don’t ignore symptoms, especially if more than one person is feeling them. If you think you are suffering from carbon monoxide (CO) poisoning, you should:
- Get fresh air immediately. Open doors and windows. Turn off combustion appliances and leave the house.
- Go to an emergency room. Be sure to tell the physician that you suspect CO poisoning.
- Be prepared to answer the following questions: Is anyone else in your household complaining of similar symptoms? Did everyone’s symptoms appear about the same time? Are you using any fuel-burning appliances in the home? Has anyone inspected your appliances lately? Are you certain they are working properly?

What About Carbon Monoxide Detectors?
Carbon monoxide (CO) detectors can be used as a backup but not as a replacement for proper use and maintenance of your fuel-burning appliances. CO detector technology is still being developed and the detectors are not generally considered to be as reliable as the smoke detectors found in homes today. You should not choose a CO detector solely on the basis of cost; do some research on the different features available.
Carbon monoxide detectors should meet Underwriters Laboratories Inc. standards, have a long-term warranty, and be easily self-tested and reset to ensure proper functioning. For maximum effectiveness during sleeping hours, carbon monoxide detectors should be placed close to sleeping areas.
If your CO detector goes off, you should:
- Make sure it is the CO detector and not the smoke alarm.
- Check to see if any member of your household is experiencing symptoms.
- If they are, get them out of the house immediately and seek medical attention.
- If no one is feeling symptoms, ventilate the home with fresh air and turn off all potential sources of CO.
- Have a qualified technician inspect your fuel-burning appliances and chimneys to make sure they are operating correctly.
## Appendix 3 – Table of Cases

**Non-Intentional Poisoning of Children (0 – 14 years) in Victoria**

1988 - 2000

<table>
<thead>
<tr>
<th>Year</th>
<th>Age</th>
<th>Gender</th>
<th>Poisoning Agent</th>
<th>Method of Poisoning</th>
<th>Poison Classification</th>
<th>How Child Accessed Poison</th>
<th>Presence of Safety Devices / Measures</th>
<th>Location of Poison</th>
<th>Source of Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988</td>
<td>3 years</td>
<td>Male</td>
<td>Strychnine</td>
<td>Ingestion</td>
<td>Pesticide - classification = “rodenticide”</td>
<td>Found bottle in an old shed on deceased’s parent’s property</td>
<td>No – lid was off</td>
<td>An old shed on the deceased’s parent’s property</td>
<td>State Coroner’s Office, Hazard #4, November 1989; and CCOPMM Annual Report 1988, pp 28.</td>
</tr>
<tr>
<td>Year</td>
<td>Age</td>
<td>Gender</td>
<td>Poisoning Agent</td>
<td>Method of Poisoning</td>
<td>Poison Classification</td>
<td>How Child Accessed Poison</td>
<td>Presence of Safety Devices / Measures</td>
<td>Location of Poison</td>
<td>Source of Information</td>
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</tr>
<tr>
<td>1990 November</td>
<td>1 year</td>
<td>Male</td>
<td>Venom from a snake</td>
<td>Envenomation</td>
<td>Venom</td>
<td>N/A</td>
<td>N/A</td>
<td>Front yard of premises where child was a visitor.</td>
<td>State Coroner’s Office; and CCOPMM Annual Report 1990, pp 35.</td>
</tr>
<tr>
<td>1994</td>
<td>3 years</td>
<td>Male</td>
<td>Hemlock</td>
<td>Ingestion.</td>
<td>Plant</td>
<td>Growing in rear yard of property the deceased was visiting</td>
<td>No</td>
<td>Growing in the garden.</td>
<td>State Coroner’s Officer, Hazard #27, June 1996; and CCOPMM Annual Report 1994, pp 55.</td>
</tr>
<tr>
<td>1996 May</td>
<td>12 years</td>
<td>Female</td>
<td>Benzodiazepine – anti-depressant therapeutic medication called “dothiepin”. Deceased’s father had been prescribed this medication.</td>
<td>Ingestion</td>
<td>Benzodiazepine</td>
<td>Presumed given the age of the deceased that she accessed it herself.</td>
<td>Unknown</td>
<td>Cupboard in the kitchen.</td>
<td>State Coroner’s Office; and CCOPMM Annual Report 1997, pp 28.</td>
</tr>
<tr>
<td>1999 March</td>
<td>7 years</td>
<td>Male</td>
<td>Venom from a snake</td>
<td>Envenomation</td>
<td>Venom</td>
<td>N/A</td>
<td>N/A</td>
<td>Outside.</td>
<td>State Coroner’s Office.</td>
</tr>
<tr>
<td>Year</td>
<td>Age</td>
<td>Gender</td>
<td>Poisoning Agent</td>
<td>Method of Poisoning</td>
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<tr>
<td>2000</td>
<td>July</td>
<td>10 years</td>
<td>Female</td>
<td>Carbon Monoxide</td>
<td>Inhalation</td>
<td>Gas</td>
<td>Omission of carbon monoxide gas which was escaping from a faulty portable gas heater in a caravan where the deceased was asleep.</td>
<td>No</td>
<td>Inside caravan</td>
</tr>
<tr>
<td>2000</td>
<td>August</td>
<td>10 months</td>
<td>Female</td>
<td>Petroleum Spirit “shellite”.</td>
<td>Ingestion</td>
<td>Cleaning product.</td>
<td>Shellite was open on the floor and deceased crawled over and consumed a small amount.</td>
<td>Child-proof cap was present however the bottle was open at the time of the incident.</td>
<td>On the floor next to the deceased’s mother who was cleaning the photocopier.</td>
</tr>
<tr>
<td>Year</td>
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<tr>
<td>2000 November</td>
<td>16 months</td>
<td>Female</td>
<td>Venom from a snake [Brown Snake]</td>
<td>Envenomation</td>
<td>Venom</td>
<td>N/A</td>
<td>N/A</td>
<td>Outside.</td>
<td>State Coroner’s Office.</td>
</tr>
</tbody>
</table>